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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/847,901	05/02/2001	Masajiro Inoue	SIW-008	7510

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LAHIVE & COCKFIELD, LLP.
28 STATE STREET
BOSTON, MA 02109

EXAMINER

ALEJANDRO, RAYMOND

ART UNIT PAPER NUMBER

1745

DATE MAILED: 12/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/847,901

Applicant(s)

INOUE ET AL.

Examiner

Raymond Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 October 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4 and 5 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4 and 5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05/02/01 & 09/04/03 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

This office submission is being provided in response to the amendment filed 10/13/04. The applicants have overcome the double patenting rejection as a terminal disclaimer to obviate such rejection has been submitted. Refer to the abovementioned amendment for specific details on applicant's rebuttal arguments. However, the present claims are finally rejected as set forth hereinbelow and for the reasons of record:

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

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the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-2 and 4 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Jones 6007933.

The instant application is directed to a fuel cell wherein the disclosed inventive concept comprises the specific seal feature.

As to claim 1:

Jones discloses a fuel cell assembly including end plates and current collectors/conductor plates with a working section therebetween (col 5, lines 15-20); wherein working section includes a number of layers (col 5, lines 25-26); preferably, a plurality of layers form one or more PEM-type fuel cells (col 5, lines 35-38). PEM represents a proton exchange membrane or polymer Electrolyte membrane, the PEM is a solid polymer electrolyte (col 1, lines 26-38).

Figure 3 shows fluid flow plates serving as flow field plates in a fuel cell.

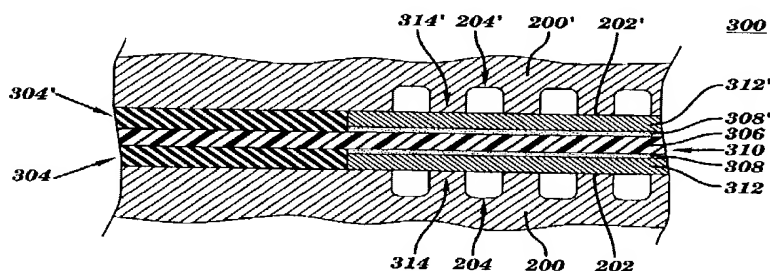


FIG. 3

As seen in Figure 3, fuel cell 300 includes the membrane electrode assembly (MEA) 310 comprising a solid polymer electrolyte 306, catalyst 308 and 308' which facilitate chemical reaction are applied to the anode and cathode sides, respectively of the solid polymer electrolyte.

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This unit can be referred to as a membrane electrode assembly (col 6, line 56 to col 7, line 4).

The MEA is sandwiched between anode and cathode gas diffusion layers 312 and 312', respectively (col 7, lines 5-8).

For purposes of illustration, Figure 3 also depicts the fuel cell with fluid flow plates 200 and 200' serving as flow field plates (it is noted that separator plates are sometimes referred to as flow field plates, that is, separator plates are also conventionally known in the art as flow field plate), in particular, flow field plate 200 might serve as an anode side of the fuel cell, and flow field plate 200' might serve as a cathode side of the fuel cell. That is, face 202 might comprise an anode face, and face 202' might comprise a cathode face (col 6, lines 44-50).

Jones discloses that gasketing material or gaskets 304, 304' can be employed to seal peripheral holes. A given gasket might take the form of, for instance, a frame gasket made from polytetrafluoroethylene material (col 6, lines 34-42). As depicted in Figure 3, the gasketing material 304, 304' contacts the end faces of both gas diffusion layers 312 and 312'.

With respect to gasketing material or gasket, it is noted that a gasket is a material or a member used to make a joint fluid tight. Accordingly, gasketing material is a sealing agent which provides a tight closure to prevent the passage or return of fluids so as to close or male secure against access, leakage or passage. Thus, the gasketing material or gasket is interpreted to serve as a seal provided on the flow field plates.

Examiner's note (A): the limitation reciting that "a liquid sealant...which hardens while in close contact with both end faces of the first gas diffusion layer and the second gas diffusion layer to provide a seal with certain degree of elasticity" (liquid sealant at the time of application) has been construed now as a product-by-process limitation, thus, it is noted that the

product itself (i.e. the seal as used in the fuel cell) does not depend on the process of making it. Accordingly, in a product-by-process claim, the patentability of a product does not depend on its method of production. In that, it is further noted that the product in the instant claims is the same as or obvious over the product of the prior art. In this regard, it is further noted that applicants disclose the liquid sealant hardens into solid sealant while maintaining certain degree of elasticity even after the seal has been formed; and that the liquid sealant is made of a thermosetting fluorine-containing (refer to page 11, third full paragraph of applicants' specification). Given that, it is noted that the recitation which hardens while in close contact with both end faces of the first gas diffusion layer and the second gas diffusion layer to provide a seal with certain degree of elasticity (or a seal, provided onto the separators, which was liquid sealant at the time of application) is interpreted as a solid seal per se because such limitation refers to the initial state of the liquid sealant at the time of application, but the final state (the working seal) of the seal is solid as the liquid sealant hardens into solid sealant; accordingly, it is noted that Jones' teaching encompasses the solid seal formed to contact the fuel cell components. Thus, Jones' frame gasket made from polytetrafluoroethylene material (fluorine-container polymer) is a solid sealing material employed to provide a tight closure or seal in the fuel cell.

In addition, as to the method limitation, i.e. "which hardens...to provide a seal with a certain degree of elasticity", it is noted that a method limitation incorporated into a product claim does not patentable distinguish the product because what is given patentably consideration is the product itself and not the manner in which the product was made. Therefore, the patentability of a product is independent of how it was made.

With respect to claim 2:

As illustrated in Figure 3, the edge of solid polymer membrane 306 extends beyond (extended/projecting portion) the end faces of the anode and cathode side; and the gasketing material 304, 304' contacts the extended portion of the solid polymer electrolyte.

With respect to claim 4:

As shown in Figure 3, the gasketing material 304, 304' contacts the end faces of both gas diffusion layers 312-catalyst 308 and gas diffusion layers 312'-catalyst 308' which are considered to be the anode and cathode electrode sides, respectively.

Therefore, the claims are anticipated by Jones'933. However, if the claims are not anticipated the claims are obvious as it has been held similar products claimed in product-by-process limitations are obvious In re Brown 173 USPQ 685 and In re Fessman 180 USPQ 324 (*Refer to MPEP 2113: Product-by-Process Claims*).

Claim Rejections - 35 USC § 103

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

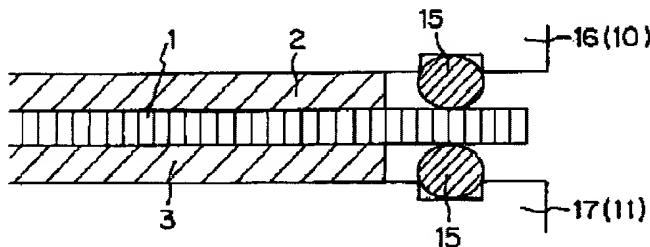
6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jones 6007933 as applied to claim 1 above, and further in view of Japanese publication JP 08-148169.

Jones is applied, argued and incorporated herein for the reasons above. However, Jones does not disclose the seal provided in grooves formed in the separator.

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The JP'169 publication illustrates in Figure 2 a fuel cell structure including gas diffusion electrode wherein the separators 16, 17 provide grooves which are contacted and sealed by O-ring seals 15 (Figure 2 and section 0008).

【 2 】



In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to seal Jones' separators by providing grooves thereon (*seal provided in grooves in the separator to seal them*) so as to obtain a seal-groove sealing structure as taught by the JP'169 publication as the JP'169 publication teaches that when plates or frames (separators) constitute the main enclosing member of the fuel cell structure, an O-ring seal disposed between grooves formed in the separator enhances and ensures the adhesion of both separators. Further, the O-ring-grooves sealing feature provides a sealing technique having the advantage of employing adhesive forces without damaging fuel cell elements. Thus, this provides a sealing feature that ensures a sufficient sealing effect only through light pressing of the polymeric electrolyte film of fuel cell, and preventing damages to the electrolyte film per se. *The teaching of JP'169 is also consistent with another embodiment of Jones teaching and encompassing the employment of O-ring gaskets.*

Response to Arguments

7. Applicant's arguments filed 10/13/04 have been fully considered but they are not persuasive.

8. Applicant's arguments with respect to claims 1-2 and 4-5 have been considered but are moot in view of the new ground(s) of rejection (please, note that the present claims have been rejected under the 35 USC 102/103 statute as being directed to a product-by-process claim).

9. Applicants' position that the recitation "*a liquid sealant having a viscosity provided on the separators, which hardens while in contact with both end faces of the first gas diffusion layer and the second gas diffusion layer to provide a seal with a certain degree of elasticity*" carries patentable weight is respectfully disagreed with. Firstly, it is now contested that such recitation have been construed as being directed to a product-by-process limitation. Hence, the product itself (*i.e. the seal as used in the fuel cell*) does not depend on the process of making it. Accordingly, in a product-by-process claim, the patentability of a product does not depend on its method of production. In that, it is further noted that the product in the instant claims is the same as or obvious over the product of the prior art. Therefore, since a product-by-process claim is still a product claim and is not limited to the manipulations of the recited steps, only the structure implied by the steps, the burden now shifts to the applicants to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product.

10. In response to applicant's argument that: a) "*Because the size and configuration of the seal is set prior to assembly, it is difficult to prepare a solid seal having accurate dimensions that is sizes and configured to precisely fit to both ends of the first and second gas diffusion layers*"; b) "*the use of a seal formed of a liquid sealant that is liquid at the time of application allows for*

the resulting seal to have a size and shape that precisely matches the region of the fuel cell in which the seal is located "; c) *"the claimed seal, which is liquid sealant at the time of application, hardens in compliance with the thickness of the electrolyte membranes and the diffusion membrane..."*, the fact that applicant has recognized another advantage/disadvantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

11. Moreover, it is still contended that applicants' seal needs to harden in order for the liquid sealant to be fully functional so as to satisfy its workable and structural interrelationship of providing a seal structure for sealing the fuel cell. That is to say, the sealant material in its liquid state fails to provide the necessary functional and/or structural distinction to support patentability because the liquid sealant which necessarily hardens to provide a seal, as instantly claimed, does not serve to precisely define or impart present structural attributes of interrelated fuel cell component/parts of the claimed invention. Accordingly (*as admitted by the applicants*), the prior art does disclose a solid gasket made from specified material and therefore, it is herein maintained that the solid (hardened) seal of the prior art provides the required physical attributes for implementing the defined requisite degree of functionality. Furthermore, the examiner also points out that *the solid gasket sealing material of the prior art* performs exactly the identical function specified in the instant claim in substantially the same way, and produces substantially the same results as the claimed hardened liquid sealant of the present invention. Since there are insubstantial differences between *the solid gasket sealing material of the prior art* and the claimed hardened liquid sealant, the burden is shifted to the applicant to provide objective

evidence demonstrating that Jones' solid gasketing sealing material when used as instantly claimed will indeed cause detrimental effects thereto.

12. Furthermore, with respect to the limitation, in particular, "which hardens to provide a seal with certain degree of elasticity", the examiner wishes to indicate that applicants disclose the liquid sealant hardens into solid sealant while maintaining certain degree of elasticity even after the seal has been formed; and that the liquid sealant is made of a thermosetting fluorine-containing (refer to page 11, third full paragraph of applicants' specification). In that, it is noted that the recitation "which hardens to provide a seal with certain degree of elasticity" is being interpreted as any solid seal per se because such limitation refers to the initial state of the liquid sealant at the time of application, but the final state, the working seal, of the seal is solid as the liquid sealant hardens into solid sealant; as a result, it is noted that Jones' teaching encompasses the solid seal formed to contact the fuel cell components. Thus, Jones' frame gasket made from the specified fluorine-containing polymer is a solid sealing feature employed to provide a tight closure or seal in the fuel cell.

13. Moreover, as to the method limitation, i.e. "which hardens to provide a seal with a certain degree of elasticity", it is noted that a method limitation incorporated into a product claim does not patentable distinguish the product because what is given patentably consideration is the product itself and not the manner in which the product was made. Therefore, the patentability of a product is independent of how it was made.

14. Furthermore, applicants are still arguing the seal is formed of a certain material having selected properties and capabilities (the material used to form the seal) i.e. materials such as a thermosetting fluorine-containing material or thermosetting silicon (see amendment, page 4,

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third full paragraph). However, the present claims are silent as to a specific material and/or its composition. Although applicants have now included the limitation “having a viscosity” and “a certain degree of elasticity”, it is contended that any materials, in general, exhibit a degree of viscosity (the property of resistance to flow) and elasticity (the capability of a strained body to recover its size and shape after deformation). For that reason, in the absence of magnitudes further limiting the viscosity and/or elasticity properties, the examiner is concluding that the solid gasketing material of the prior art (regardless of its chemical and physical composition) exhibits certain degrees of viscosity and elasticity and therefore, it meets the requirement of being viscous and/or elastic.

15. With respect to the assertion, previously argued, that the prior art of record does not teach or suggest a fuel cell having electrodes that are separate from a gas diffusion layer, and closer to a membrane. However, this assertion is respectfully disagreed with. In this regard, it is noted that the primary reference does, in fact, clearly teach or show in **FIGURE 3** above a fuel cell 300 including a membrane electrode assembly (MEA) 310 comprising a solid polymer electrolyte 306, catalysts 308 and 308' which facilitate chemical reaction and sandwiched between the anode and cathode gas diffusion layers 312 and 312', respectively. In that, it is pointed out that catalyst electrode materials 308 and 308' are separate layers themselves and are located closer to the solid polymer electrolyte membrane than respective gas diffusion layers. It is also noted that fuel cell electrodes are conventionally composed of the catalyst layer itself which facilitate chemical reaction and the gas diffusion layer to diffuse the reacting gas. It appears the applicants are confusing the fluid flow plates 200 and 200' and their respective faces 202 and 202' acting as the anode side and the cathode side of the fuel cell as the particular anode catalytic electrode and

cathode catalytic electrode. In general, the side wherein fuel reactant flows in or is introduced into is known as the anode side, whereas the side wherein oxidant reactant flows in or is introduced into is known as the cathode side. That is why the '933 patent is making reference to both the anode side and the cathode side of the fuel cell so as to provide structural orientation of the fuel cell components. However, the specific site where the electrochemical reaction takes place is in the membrane electrode assembly per se including the catalyst feature necessary to carry out such reaction. Hence, in view of the specific embodiment orientation and structural arrangement of the fuel cell components of the primary reference, the present claims remain anticipated.

Conclusion

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro
Examiner
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A handwritten signature in black ink, appearing to read 'RAY', with a long horizontal stroke extending to the right.